
Mississippi National River and Recreation Area

U.S. National Park Service
Department of the Interior



River otter monitoring within the Mississippi National River and Recreation Area (MISS)

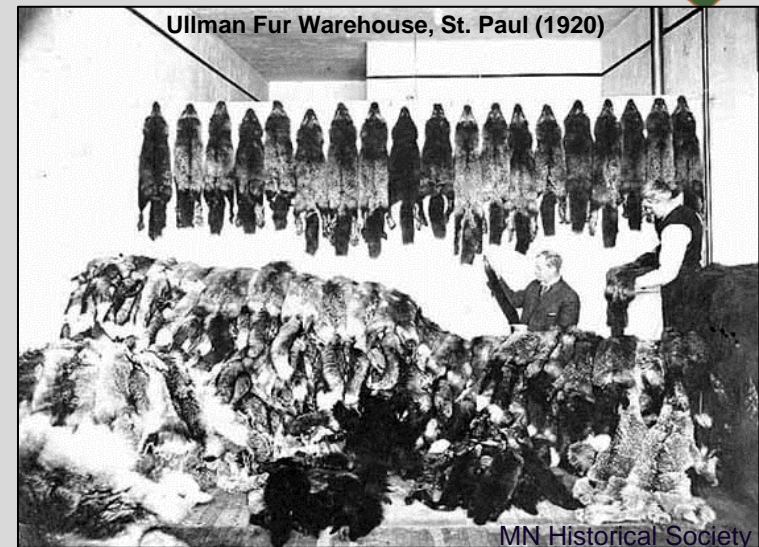
Allison Holdhusen (PI)

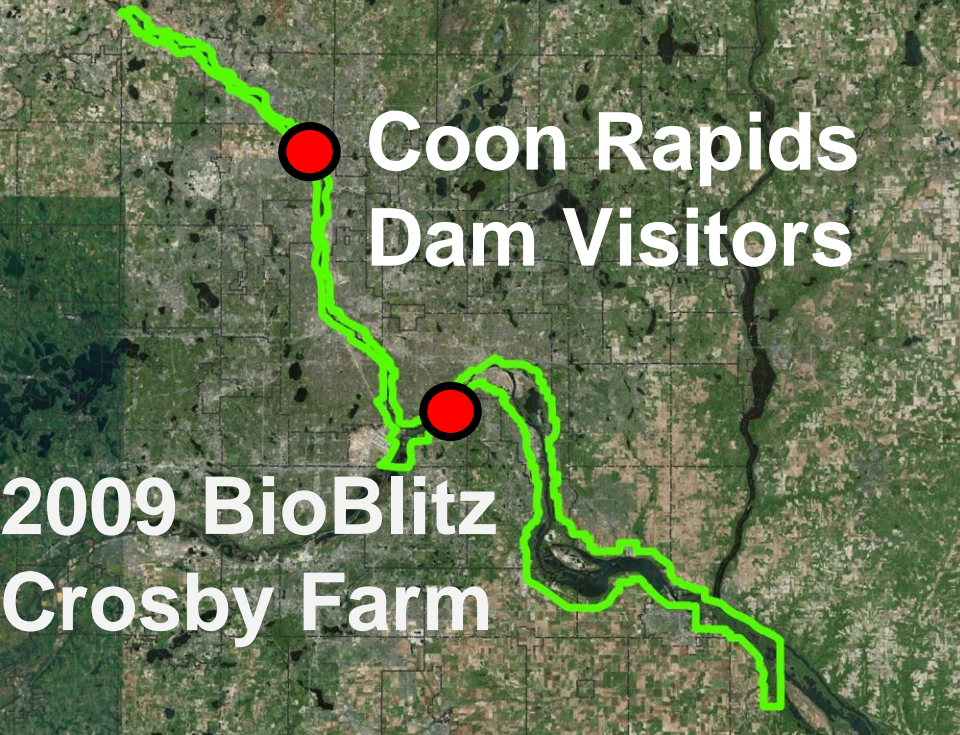


Photo by Dmitry Azovtsev, Creative Commons

Otters in MN: A Brief History

- Populations decimated by 1900's
- Water quality improvements
- CITES, Appendix II in 1977
Convention on International Trade in Endangered Species
- Reintroduction programs
21 states, 1976 - 1998
- 24 Otters from N to SE
MN 1979 - 1981
(Raesly 2001)



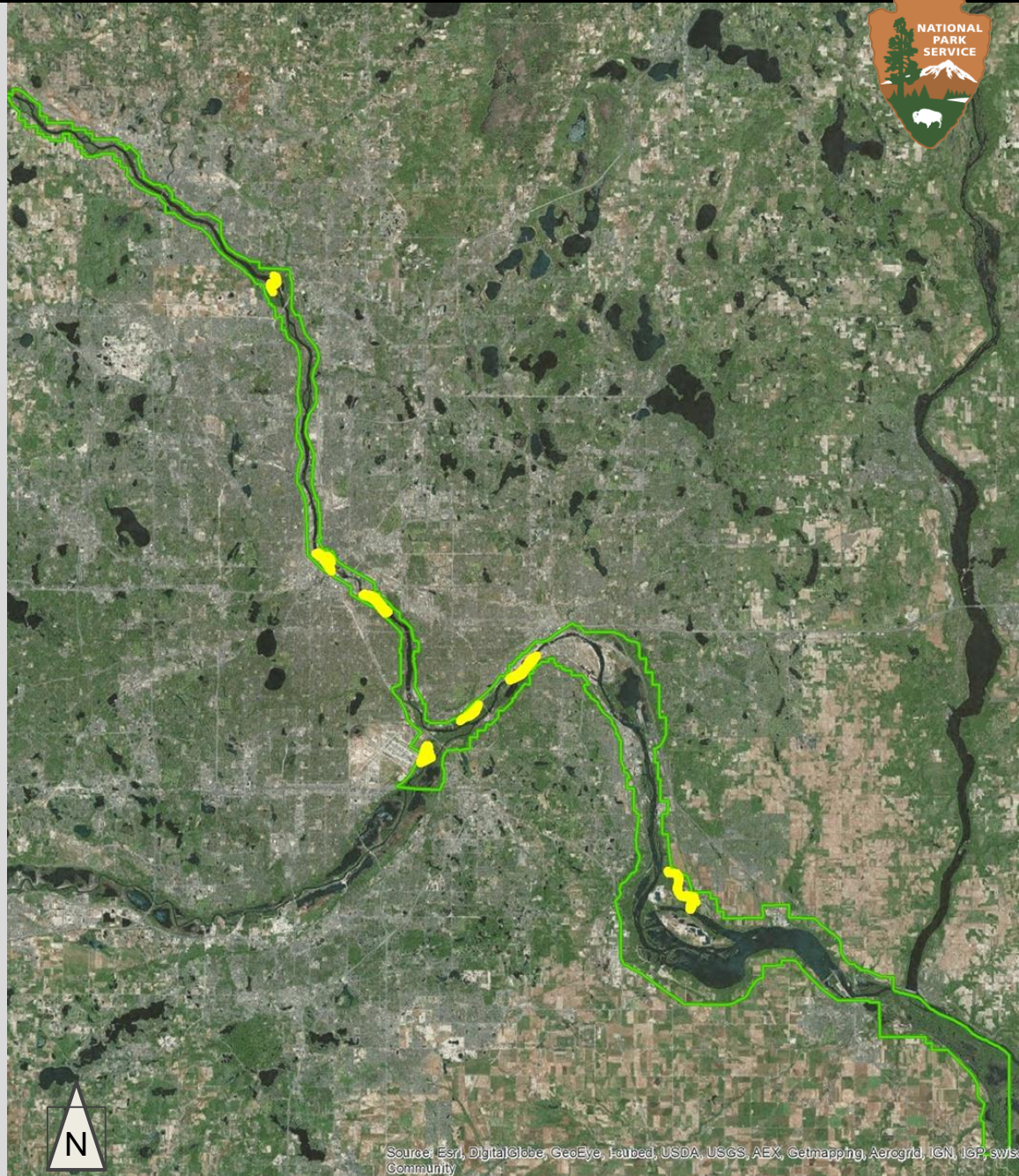


Fall 2009

Pilot study baseline otter presence

- 8, non-random sites
- 1 mile up and down stream
- Canoe and hike shorelines

Similar to common
“bridge survey” methods
(Clark et al. 1987, Crimmins et al.
2009, Roberts et al. 2008,
Shackelford et al. 1997)



Looking for

- Slides and trails near water



Looking for

- Haulouts



Otter Activity

- Otter tracks





Otter Tracks



Not to be
Confused...



Scat

10/28/2014 12:07

Latrine



Scat



04/10/2011

Scat

10/24/2014 11:29

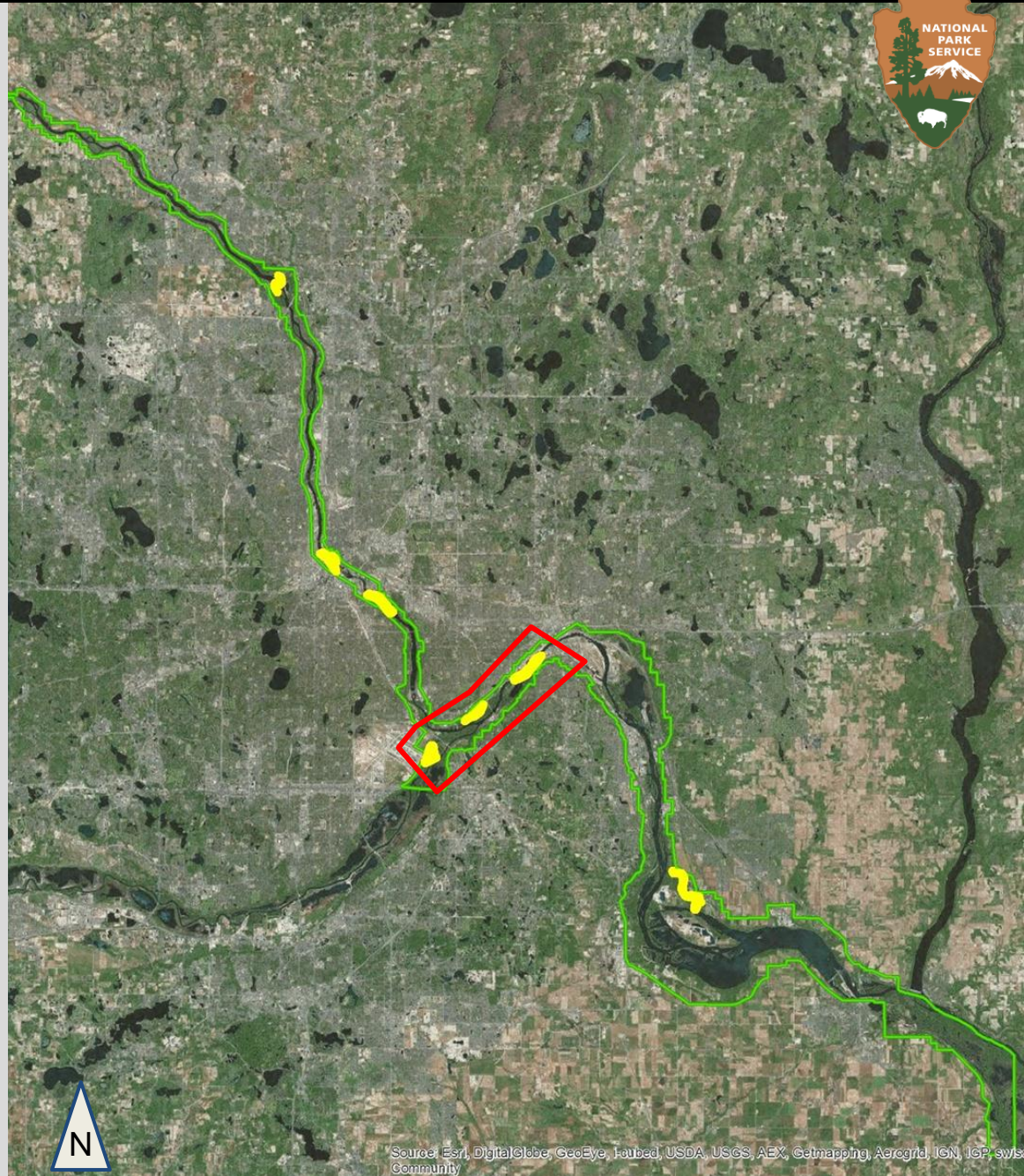
“Jellies”



Fall 2009

Pilot study baseline otter presence

- ✓ Otter presence confirmed
- ✓ Confluence area parks



Winter 2010

Volunteer surveyors

winter sign surveys by
snowshoe

Compare winter to
summer/ fall

- Otter presence
- methods
- logistics/ effort

Repeat pilot study
sites



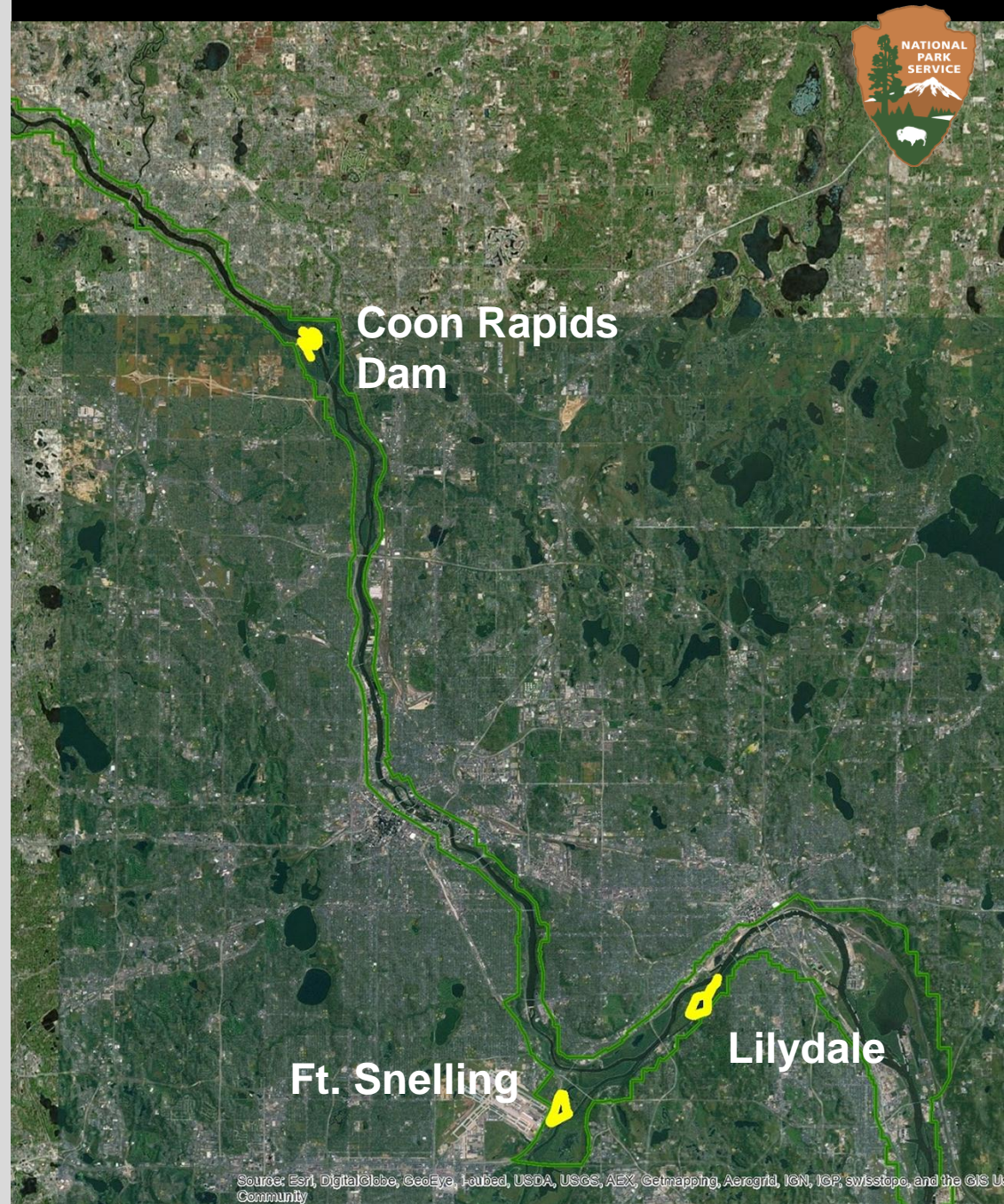




Winter 2010

Findings:

- Ease of detection
(reduced range, depend on open water)
- Timing
 - Ice cover
 - Snowfall
- GIS Maps
- Otter sign at CRD and lakes near confluence
- Year-round 'hot-spots'



With relatively little effort:

- ✓ Effective sign survey methods
- ✓ Otter 'hot-spots'

More questions:

- How many?
- Other regions of the park?
- Why do we care, anyway?

Why otter?



muskrat (*Ondatra zibethicus*) populations dramatically reduced in streams where otters were reintroduced. Williamson 2009

Why otter?



Figure 3. Contaminants being monitored in the park's eagle population

Six man-made contaminants are being monitored in bald eagle nestlings in the MNRAA corridor.

Contaminant	Primary sources	Concern
Mercury	Coal-burning power plants, mining, and degradation of products containing mercury.	Neurotoxin; cause for fish consumption advisory in the river.
Lead	Past and current industrial uses, fishing tackle, and ammunition.	Neurotoxin; especially harmful to children.
PCBs	Banned in North America. Used in the past as an industrial lubricant and coolant. Can also be formed by incomplete burning of plastics and by chemical reactions in the environment.	Causes tumors in fish, implicated in crossed-bills in fish-eating birds; known to cause cancer. Cause for fish consumption advisory in the river.
DDT (including DDE & DDD)	Banned in North America. DDT and DDD were used as pesticides; DDE is a breakdown product of DDT. DDT still used in other countries and is occasionally used illegally in North America.	The metabolite DDE was the primary cause of egg-shell thinning that caused declines in bald eagles, osprey and other predators.
PBDEs	Emissions from manufacturing and the degradation of textiles, plastics, electronic circuitry, and building materials containing these flame retardants.	Highest levels found in infants; chemically similar to PCBs; linked to impaired liver and thyroid function; possible carcinogen.
PFCs (including PFOA, PFOS)	Emissions from manufacturing and degradation of products such as coated fabrics, coated paper, and cookware.	High levels in infants; possible links to obesity, diabetes, and early menopause in women. Cause for fish consumption advisory in the river.

Source: National Park Service



Why otter?

KARE 11

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WEATHER ALERT 31 weather alerts

Another MN woman attacked by an otter

Allen Costantini, KARE 5:28 p.m. EDT August 3, 2012

11 11

SAINT MICHAEL, Minn. - Carol Schefers, 38, has no intention of swimming in a Minnesota lake again. On July 28th, she was attacked and bitten by an otter.

The incident occurred on Ude Lake in Aitkin. Schefers decided to swim across the small lake and was about 200 yards off shore when she felt more

foot.

gs. I thought it was muskies," said Schefers. "I was like wow, that is

suble. I started screaming and just kept struggling and trying to

CBS Minnesota

WCCO 4 WCCO 4 WCCO 4

COLD NO CHANGE WARM DARKENING

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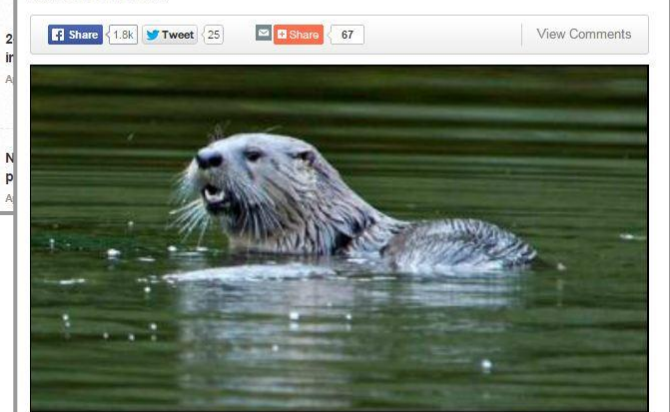
HYATT PLACE WELCOME TO A different PLACE

Local

Otter Attacks Mpls. Girl in Western Wisconsin

August 13, 2014 5:51 PM

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When otters attack

Jon Collins · ST. PAUL, Minn. · Aug 3, 2012 Environment

Another Minnesota woman was attacked by an otter while swimming last weekend. It was the second attack in a month. An animal expert said the attacks could be due to pressures on otter habitats caused by development.

A St. Michael woman was attacked and bit 18 times last weekend while swimming in a lake near Aitkin. In mid-July, a woman was also bit more than two dozen times while swimming in a lake near Duluth.

George Parsons, director of fishes at Shedd Aquarium in Chicago, said otters are part of the weasel family. He said they'll sometimes use their very sharp canine teeth to defend their dens or young.

"The number of bites per victim is a little bit astounding to me," Parsons said on MPR's All Things Considered on Friday. "Usually they'll bite three or four times and then kind of give up."

Parsons said otter habitats are being threatened by development, which just increases the chance that otters and people will come into contact.

StarTribune

Beware of otter: Two more take bites out of St. Michael swimmer

Article by: KELLY SMITH
Star Tribune
August 2, 2012 - 11:25 PM

Forget pesky mosquitoes or black bears. It's angry otters that are chasing visitors out of the woods in northern Minnesota.

In less than a month, unusually aggressive otters have attacked two Twin Cities women swimming in lakes about 60 miles apart. They're two of the three attacks reported to the state in the past three months, puzzling experts who say otters are generally meek, playful creatures.

The latest victim, Carol Schefers, 38, of St. Michael, was swimming at her family's cabin on tiny Ude Lake near Aitkin last weekend when something suddenly nipped her beneath the dark, rum-colored water.

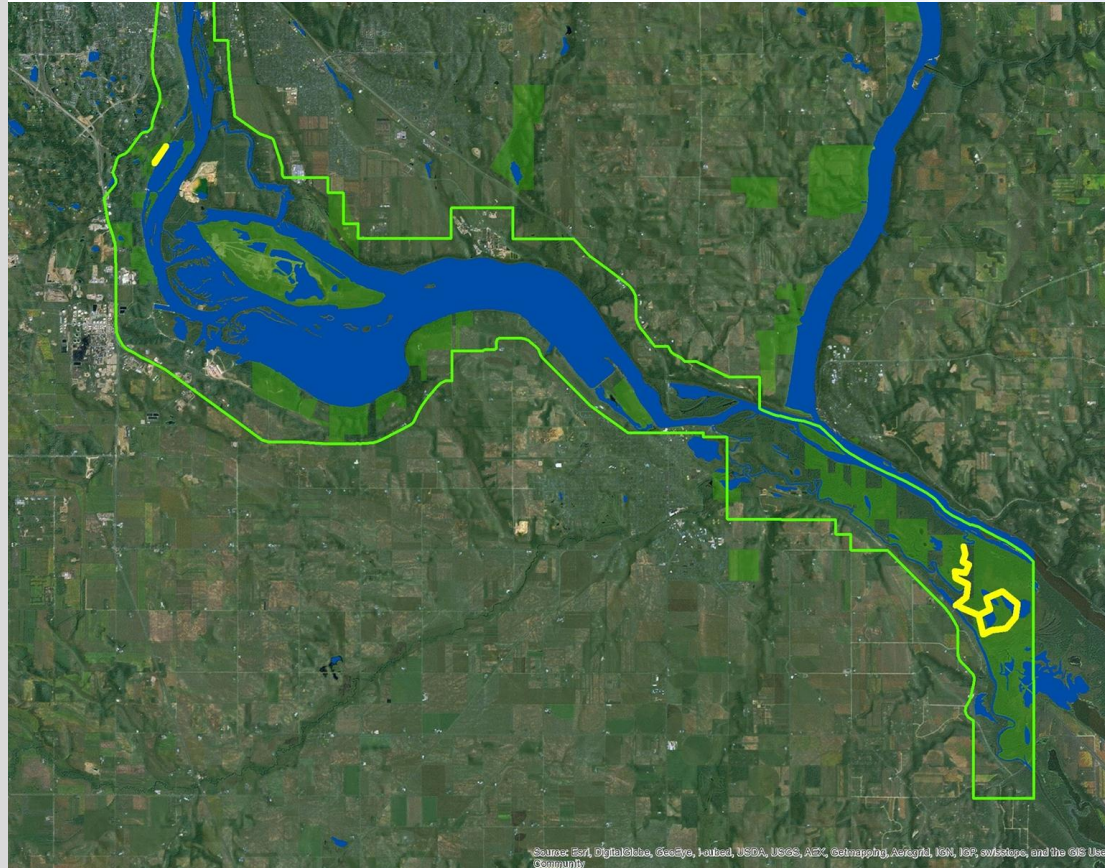
"The first thing you think is fish are attacking," she said Thursday. "I thought, 'Wow, these fish are feisty.'"

She tried to shake off the attackers, but they kept biting, seemingly trying to pull Schefers, wearing a life jacket, underwater.

Winter 2011

winter sign surveys by snowshoe

- Presence or absence
- 500m segments
- New sites
- Improved ice safety
- Better timing

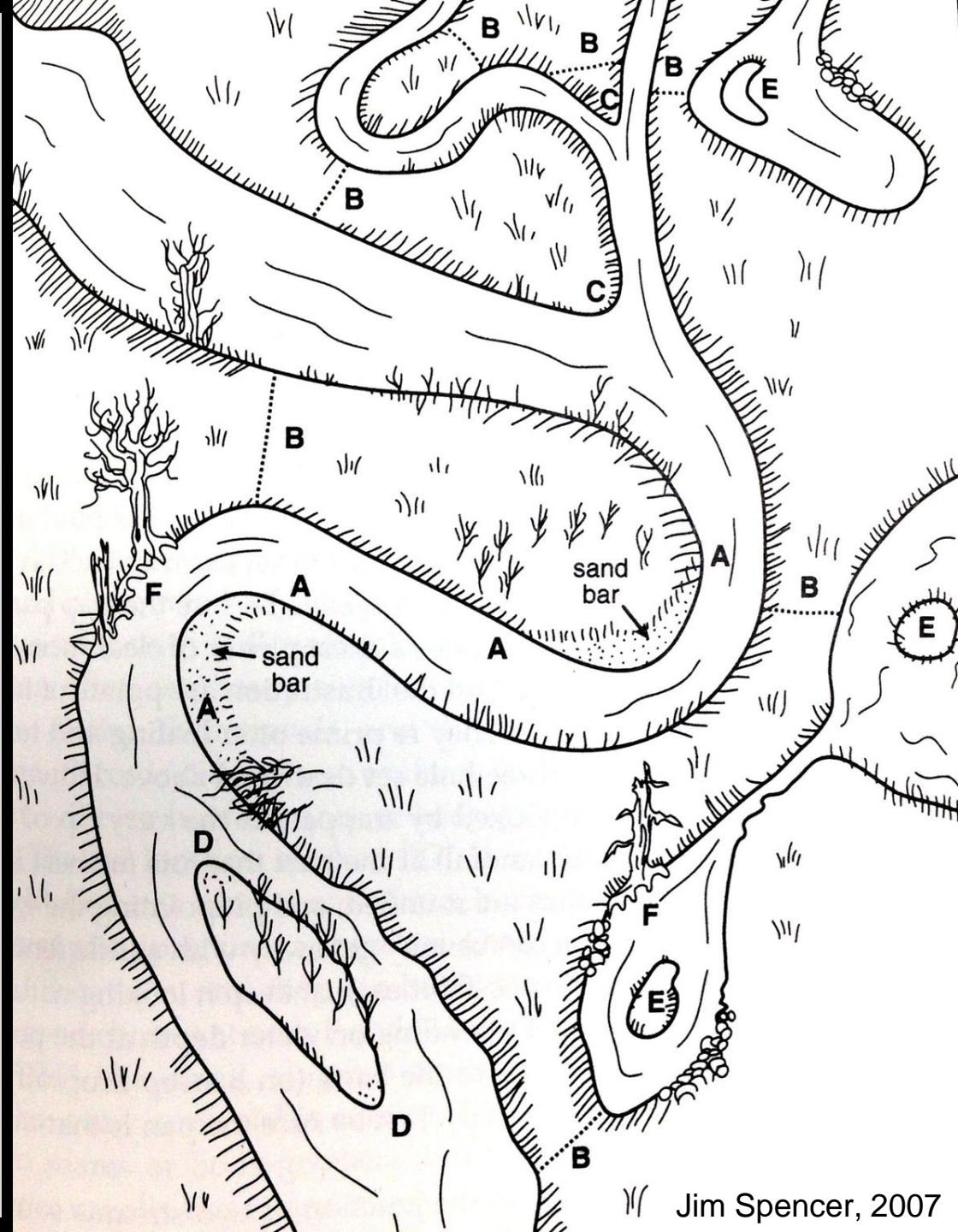


Planning survey routes

Landscape Connectivity

- Main river
- Side channels
- Riverine lakes
- Wetlands

Wildlife activity





Fort Snelling State Park
Lakeside park with
extensive trails

Minnesota River

Fort Snelling State Park Trail

Minnesota River

494

494

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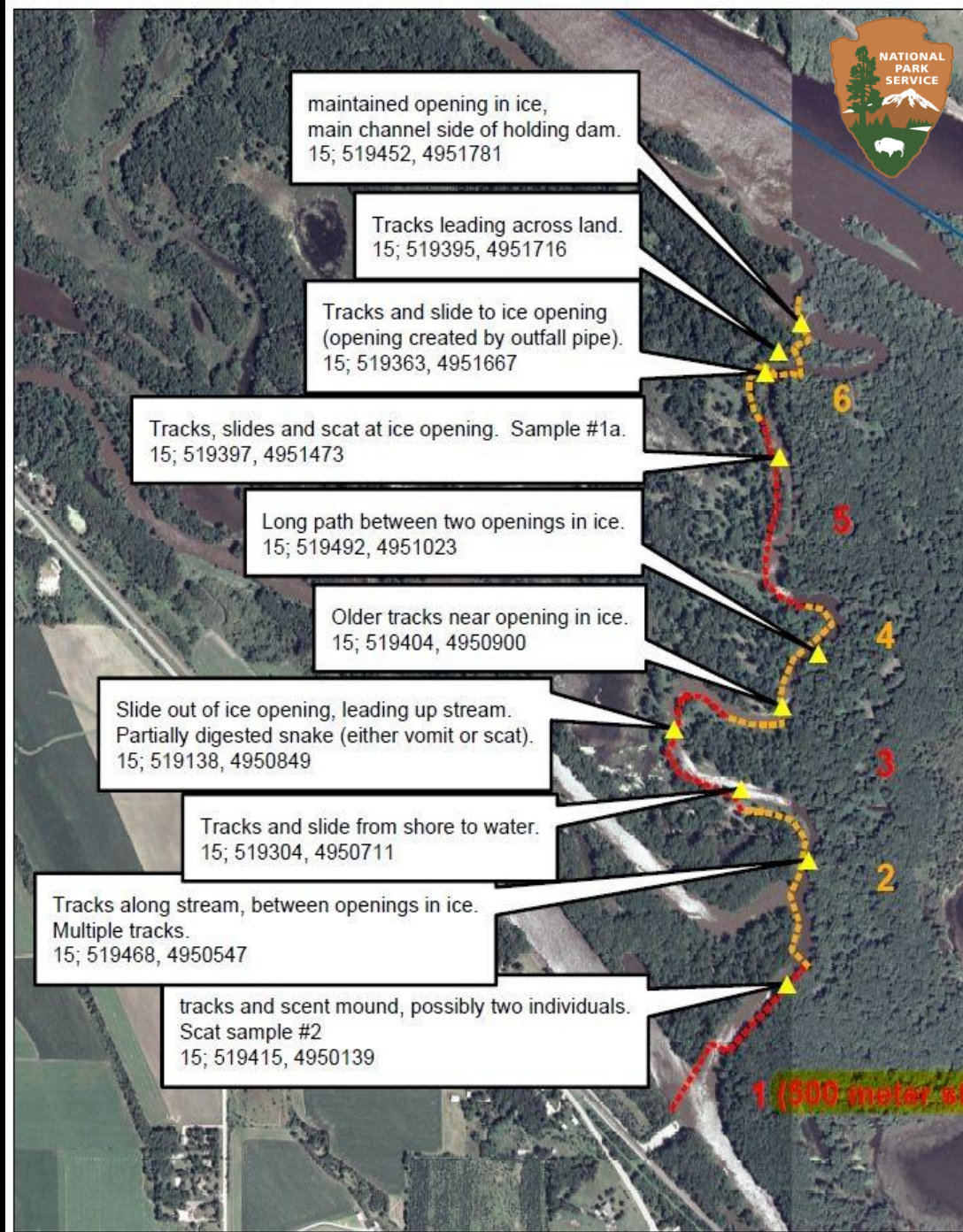
Post Rd

Post Rd

Winter 2011

winter sign surveys by snowshoe

- Long term 'transect' data
- Confluence 'hot-spots'
- Surveyed southern regions





Otter DNA

10/16/20



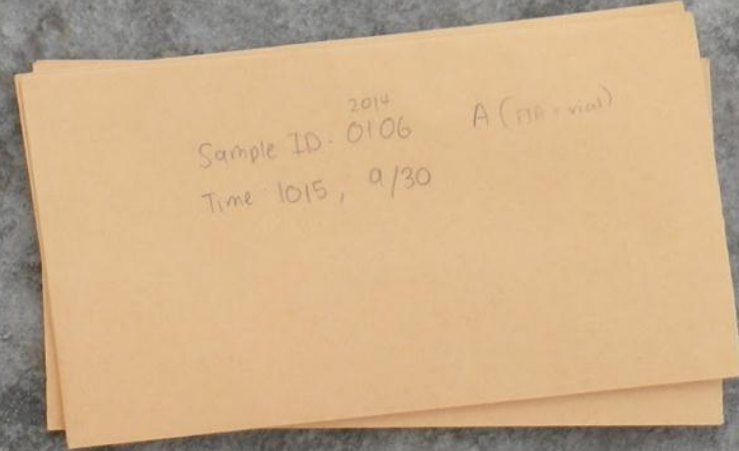
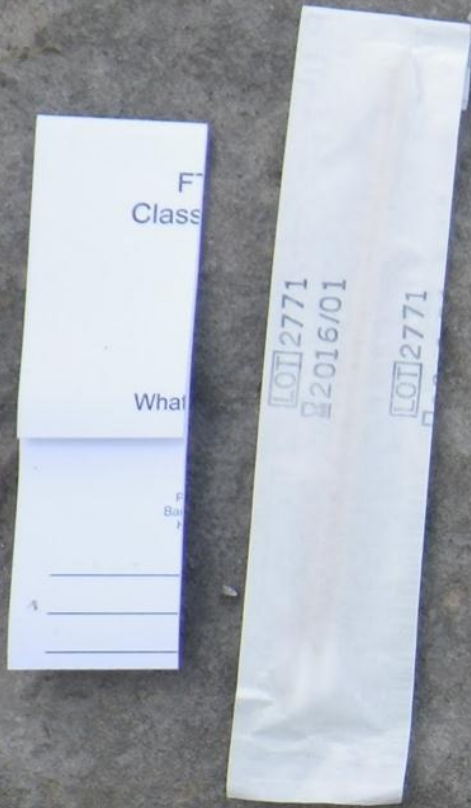
Otter DNA

Microsatellite Genotyping

- Population estimates
- Genetic diversity
- Sex ratios
- Non-invasive

10 / 16 / 20





2011 - 2012:

Low success rate
(15%) using swabs
(WGI, BC)



Lab results in progress:

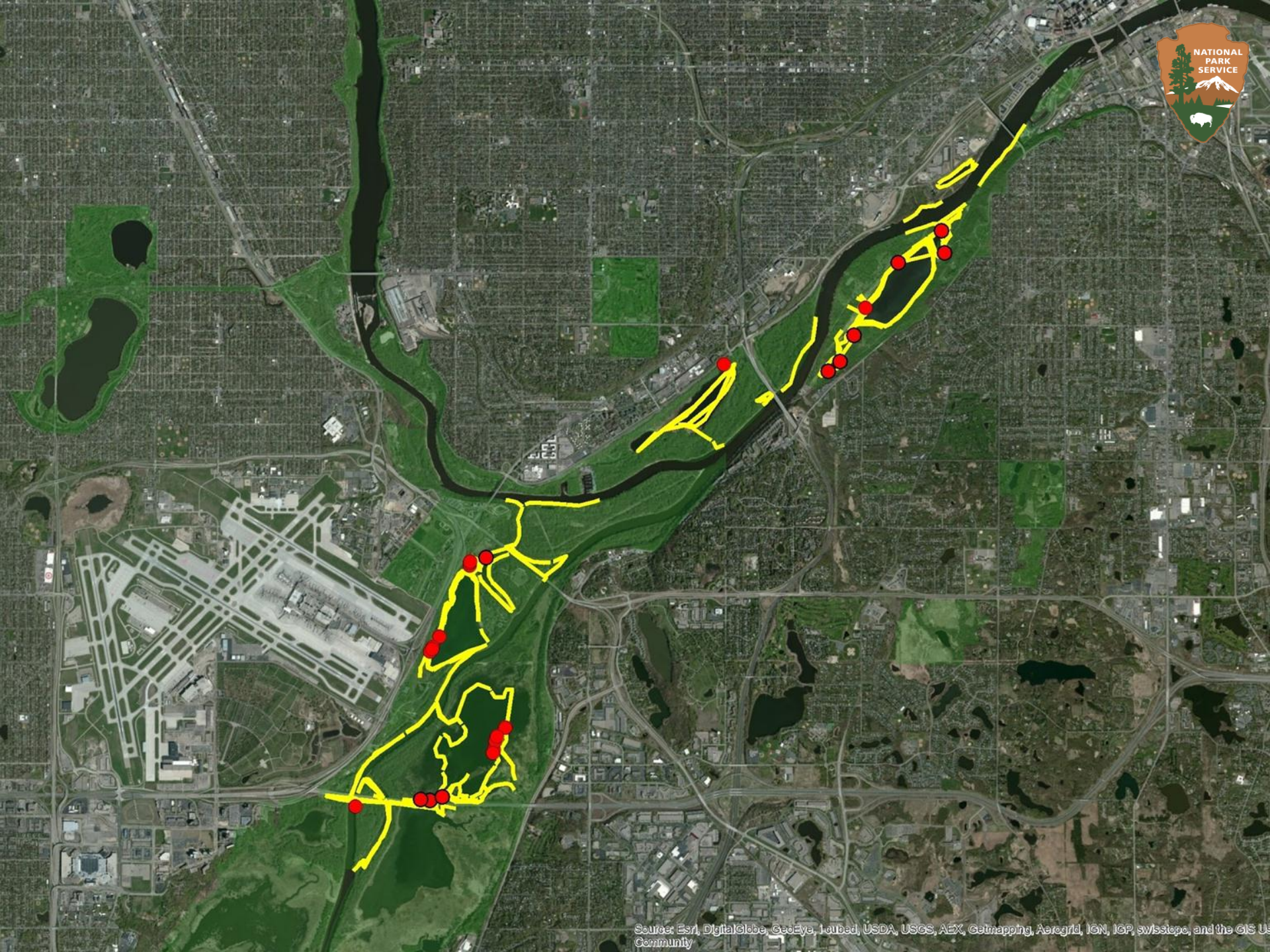
Swabs, vials, t-picks,
FTA cards (USGS, WV)

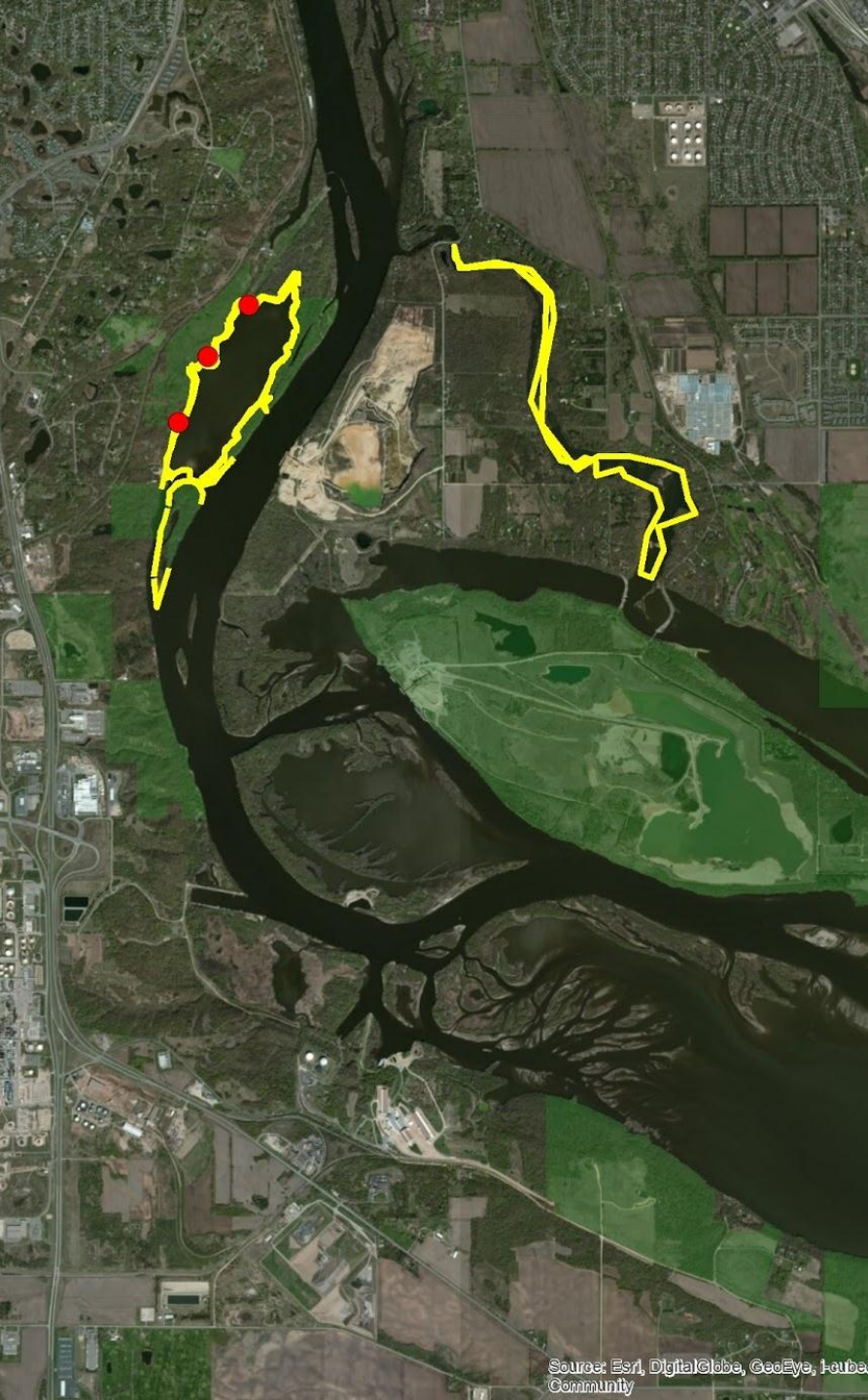
- New marker suite
- Genetic diversity
- Population estimate*

2010 - 2015

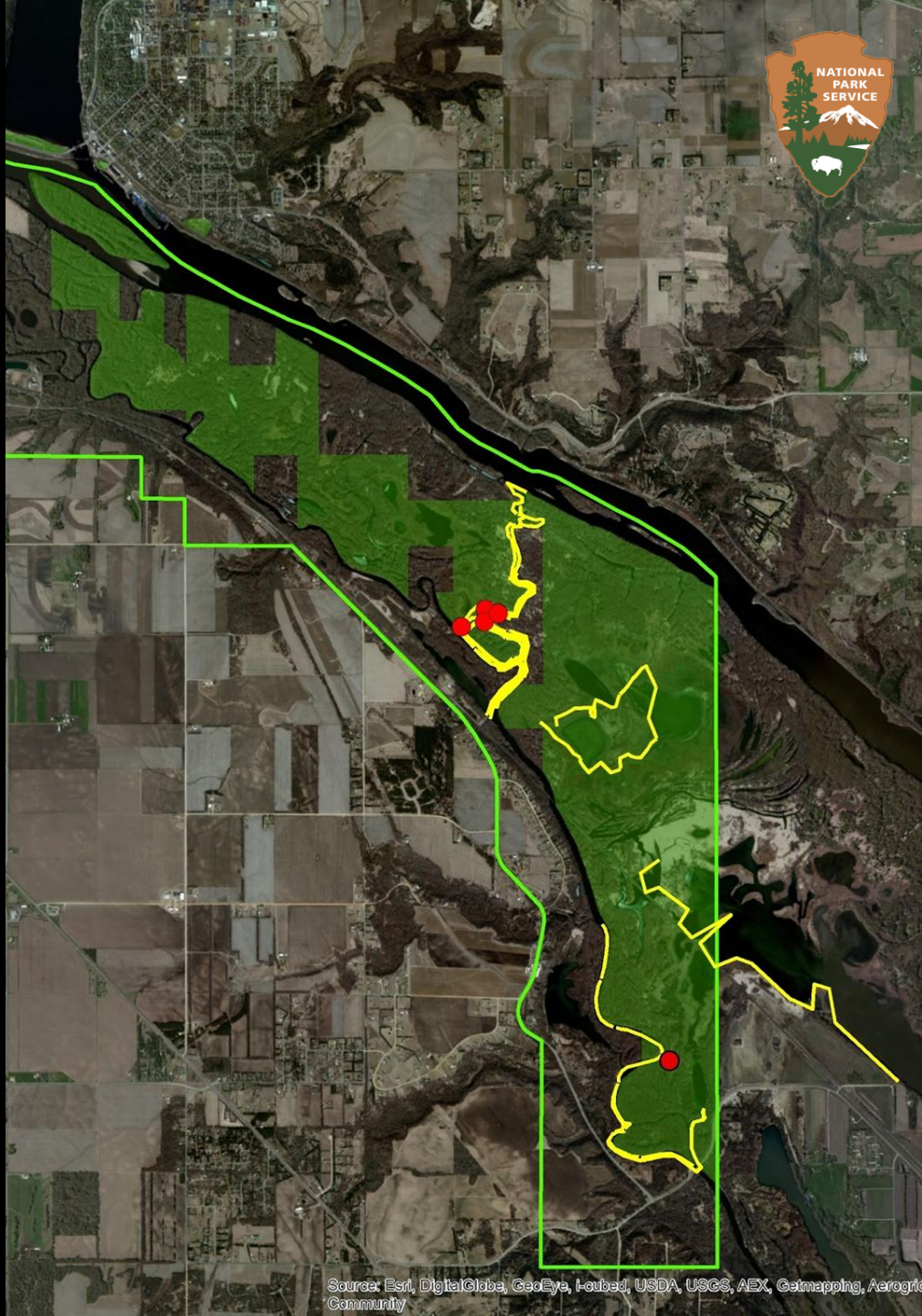








Source: Esri, DigitalGlobe, GeoEye, Iubet
Community



Source: Esri, DigitalGlobe, GeoEye, Iubet, USDA, USGS, AEX, Getmapping, Aerogrid
Community

500 m Transects



Source: Esri, DigitalGlobe, GeoEye, Irbid, USDA, USGS, AEX, Getmapping, Community



TRANSECT_ID	SURVEY_SITE	Winter 2010	Fall 2011	Winter 2011	Fall 2012	Winter 2013	Winter 2014	Fall 2014	Winter 2015
CRD_01	Coon Rapids Dam	1	0	-	-	0	-	0	-
CRD_02	Coon Rapids Dam	0	-	-	-	0	-	0	-
CRD_03	Coon Rapids Dam	0	-	-	-	-	-	0	-
CRD_04	Coon Rapids Dam	1	0	-	-	0	-	0	-
CRD_05	Coon Rapids Dam	0	0	-	-	0	-	0	-
GCL_01	Gun Club Lake	-	-	-	1	0	-	0	-
GCL_02	Gun Club Lake	-	-	-	1	1	-	0	-
GCL_03	Gun Club Lake	-	1	-	1	-	-	1	-
GCL_04	Gun Club Lake	-	0	-	0	-	-	1	-
PKL_01	Pickereel Lake	0	-	0	0	0	0	1	-
PKL_02	Pickereel Lake	1	0	0	0	0	0	-	0
PKL_03	Pickereel Lake	1	1	1	1	1	-	-	1
PKL_04	Pickereel Lake	1	0	1	1	-	-	0	-
PKL_05	Pickereel Lake	0	-	-	-	-	-	0	-
PKL_06	Pickereel Lake	0	-	-	0	-	-	0	-
PKL_07	Pickereel Lake	1	1	-	1	1	0	1	0
PKL_08	Pickereel Lake	0	1	-	1	-	-	0	-
RIV_01	River Lake	-	-	1	1	-	0	1	0
RIV_02	River Lake	-	-	-	1	-	0	0	1
RIV_03	River Lake	-	-	-	0	-	0	0	-
RIV_04	River Lake	-	-	-	0	-	-	-	-
RIV_05	River Lake	-	-	-	0	-	-	-	-
RIV_06	River Lake	-	-	-	0	-	-	-	-
RIV_07	River Lake	-	-	-	0	-	-	-	-
RIV_08	River Lake	-	-	-	0	-	-	-	-
RIV_09	River Lake	-	-	-	-	-	-	-	-
RIV_10	River Lake	-	-	-	-	-	-	-	-
RIV_11	River Lake	-	-	-	0	-	-	1	-
RIV_12	River Lake	-	-	-	0	-	-	0	-
SNL_01	Snelling Lake	1	1	-	0	-	1	1	1
SNL_02	Snelling Lake	1	0	-	0	-	0	0	0
SNL_03	Snelling Lake	1	1	-	-	-	0	0	0
SNL_04	Snelling Lake	0	-	-	-	-	0	-	-
SNL_05	Snelling Lake	1	0	-	-	-	-	-	-
SNL_06	Snelling Lake	0	-	-	-	-	-	-	1
TRU_01	Truedale Slough	-	-	1	0	-	0	0	-
TRU_02	Truedale Slough	-	-	1	1	-	1	1	-
TRU_03	Truedale Slough	-	-	1	0	-	1	-	-
TRU_04	Truedale Slough	-	-	1	0	-	-	-	-
TRU_05	Truedale Slough	-	-	1	-	-	-	-	-
TRU_06	Truedale Slough	-	-	1	-	-	-	-	-
TRU_07	Truedale Slough	-	-	0	0	-	-	-	-
VER_01	Vermillion River	-	-	0	0	-	0	0	-
VER_02	Vermillion River	-	-	1	0	-	0	1	-
VER_03	Vermillion River	-	-	-	0	0	-	-	-
VER_04	Vermillion River	-	-	-	0	0	-	-	-
VER_05	Vermillion River	-	-	-	1	-	-	-	-
VER_06	Vermillion River	-	-	-	-	0	-	-	-
TOTAL SURVEYED TRANSECTS		18	14	14	33	13	15	28	9
TOTAL PRESENCE TRANSECTS		10	6	10	11	3	3	9	4
%Presence		56%	43%	71%	33%	23%	20%	32%	44%



Site	2010 (W)	2011 (W)	2011 (F)	2012 (F)	2013 (W)	2014 (W)	2014 (F)	2015 (W)
	A	A	A	A	A	A	A	A
PKL	1	1	1	1	1	0	1	1
CRD	1	-	1	-	0	-	0	1
SNL	1	-	1	0	-	-	1	1
TRU	-	1	1	1	-	1	1	1
CRF	-	0	-	-	-	0	1	-
GCL	-	-	1	1	1	-	1	-
RIV	-	-	-	1	-	0	1	1
VER	-	-	-	1	0	-	0	-
TOTAL #SITES SURVEYED	3	3	5	6	4	4	8	6
#SITES OTTER PRESENT	3	2	5	5	2	1	6	6
% Present	100%	67%	100%	83%	50%	25%	75%	100%

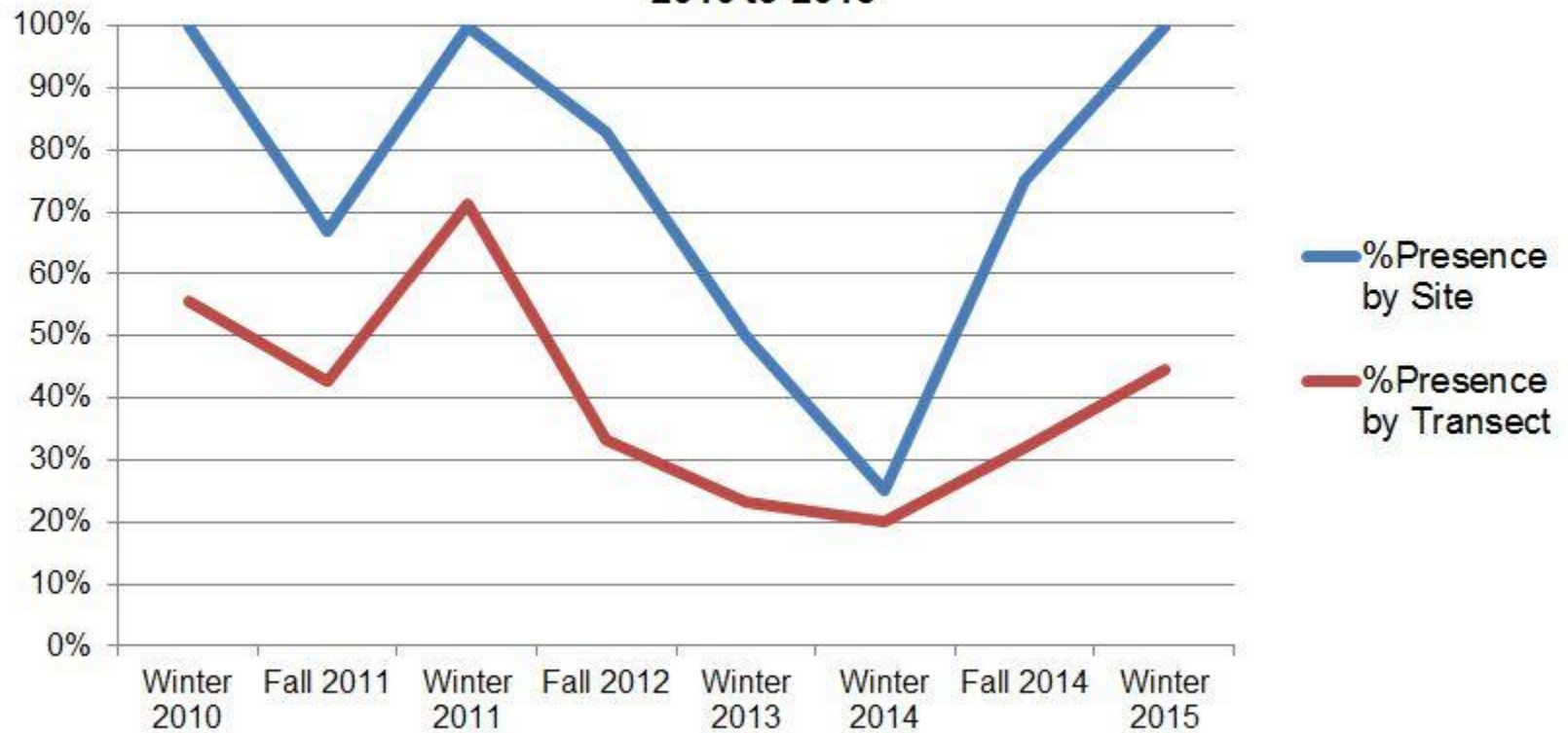
Site Abbreviations

PKL	Lilydale Regional Park (Pickerel Lake)
CRD	Coon Rapids Dam Regional Park
SNL	Ft. Snelling State Park (Snelling Lake)
TRU	Gores WMA (Truedale Slough)
CRF	Crosby Farm Regional Park
GCL	Gun Club Lake (Ft. Snelling border with MN Valley NWR)
RIV	River Lake (Katherine Ordway Natural Hist. Study Area)
VER	Lower Vermillion Bottoms (Gores WMA)



	Winter 2010	Fall 2011	Winter 2011	Fall 2012	Winter 2013	Winter 2014	Fall 2014	Winter 2015
%Presence by Site	100%	67%	100%	83%	50%	25%	75%	100%
%Presence by Transect	56%	43%	71%	33%	23%	20%	32%	44%

**Naive Analysis of Otter Presence
2010 to 2015**





Probability (site x): 1 0 1 - 1

- False absences
- Spatial Dependence
- Probability of Detection
(snowfall, observer etc.)

Program MARK or PRESENCE

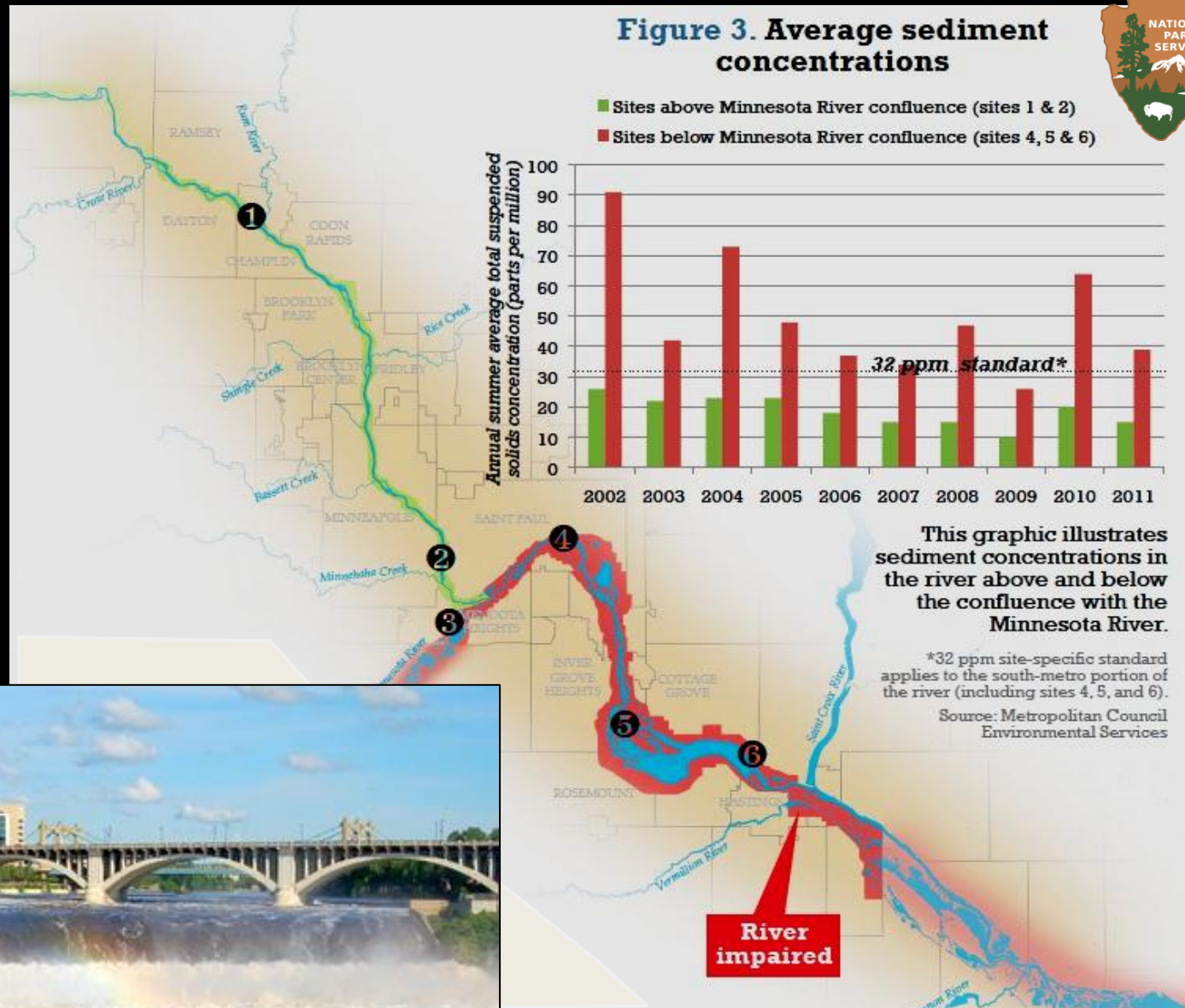
1:p	0.4327332	0.0557348
2:Psi	0.8682915	0.1112237

Otters occur almost everywhere throughout survey area (87% of transects)

fairly good chance of detecting them if they occur (43% per survey)



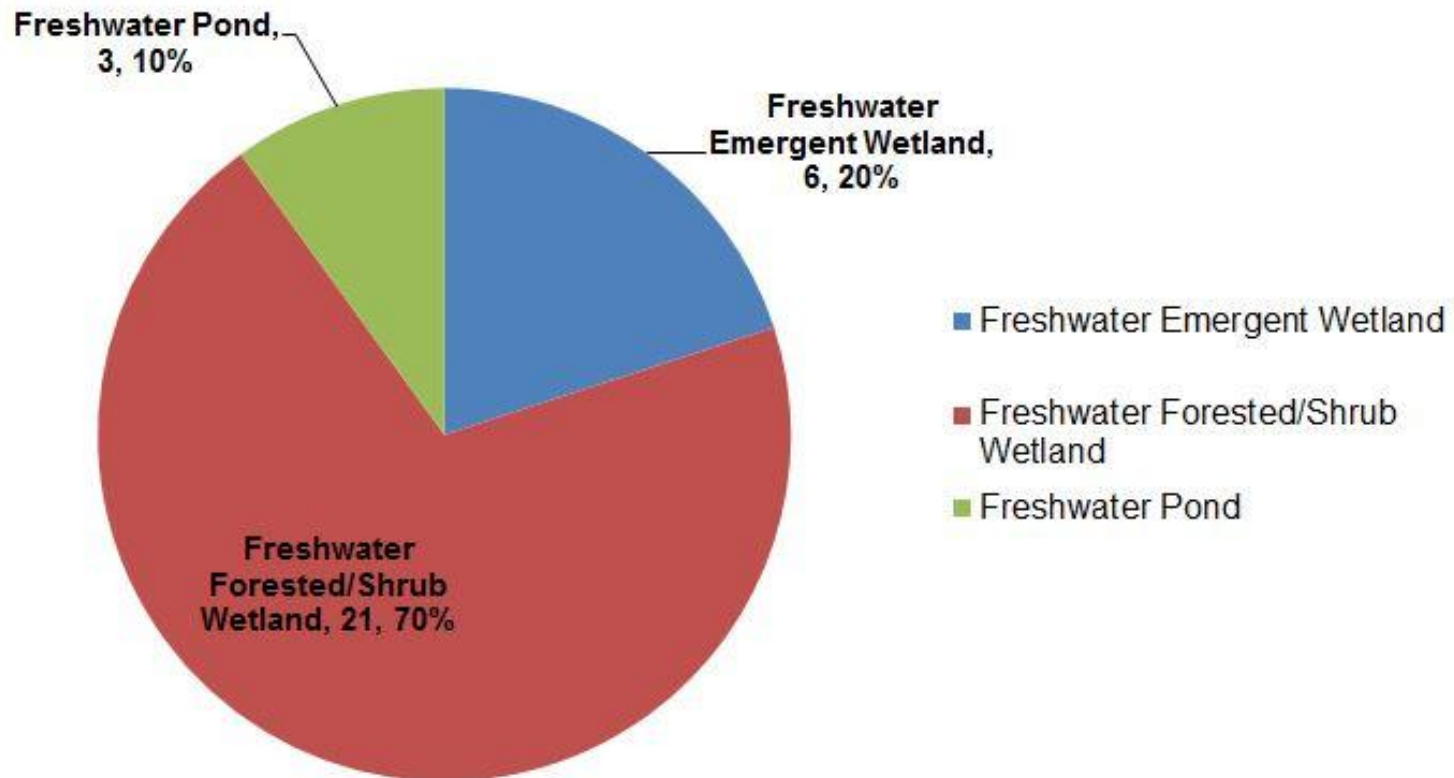
Figure 3. Average sediment concentrations



Types of wetlands found near otter latrines (found 2010 - 2015)

Wetland Type	Number of Latrines Counted
Freshwater Emergent Wetland	6
Freshwater Forested/Shrub Wetland	21
Freshwater Pond	3

Otter Latrines on Wetlands







Symbiotic species?

- Beaver structures
- Dens and burrows





Remote Cameras



[MISS OTTER VIDEO](#)



Mississippi National River and Recreation Area

Posted by Allison Rose [?] · February 11 · Edited [?] ·

Otters sliding on an iced-over tributary near the Mississippi and Minnesota Rivers #WildlifeWednesday

Fort Snelling State Park, Minneapolis, Minnesota.

<http://www.nps.gov/miss/planyourvisit/fortpark.htm>



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02/04/2015

05:28PM

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Special Thanks

Mississippi River Fund

Minnesota Zoo

Dept. of Fisheries, Wildlife, and Conservation Biology, University of MN

Great Lakes Research and Education Center

Minnesota Department of Natural Resources

Natural Resource Preservation Program

Otter Volunteers

Wildlife Genetics International

USGS Leetown Science Center



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